

Mei Qing

Post graduate student, College of Architecture and Urban Planning,
Tongji University China, Shanghai, Siping Road 1239, 200000
e-mail: 329838482@qq.com

TRANSFORMATION MECHANISM OF HISTORICAL URBAN FABRIC IN HANKOU, WUHAN

Abstract: This article selects Hankou old town in Wuhan as the research object, summarizing the current situation of the historical urban texture. Then the author analyses the historical development and transformation mechanism of the urban texture from the traditional model to model of Chinese-Western integration, due to the intervention of western culture. And it will provide references to the future research on historical urban fabric. The historical analysis of the historical urban area of Hankou is the background of the whole study. This part analyzes the main historical events in the process of urban development in Hankou, and focuses on the historical and cultural elements related to the formation of urban fabric. Then based on the historical development of the area and the intervention of western culture, the transformation mechanism is revealed. Hankou can be seen as the 'Chinese and Western Collage City', so it has gradually formed a mixture of traditional Chinese urban fabric and Western fabric. The fabric of ancient urban area is irregular, and the fabric of modern urban area is regular geometry. These two kinds of urban fabric combined together, very harmonious and permeated each other. And finally it formed the present situation of the urban fabric in Hankou historical urban area. Therefore, the overall analysis of the characteristic of Hankou's urban texture and transformation mechanism research of it can provide references for the related research and the repairing strategy of the texture in some old towns. This paper is subsidized by NSFC project which is named as <Research on Technical System of "Downtown Factory" Community-oriented Regeneration in Yangtze River Delta Region>. No.51678412. Thankful to the project owner Prof. LI Zhenyu who is the dean of College of Architecture and Urban Planning of Tongji University.

Keywords: transformation mechanism, urban texture, Hankou historical area, historical research.

Introduction

The definition of urban texture

Urban texture is an important aspect of the deep structure of the city and is an element of the city. It is a way of expressing the characteristics of urban space. (Figure 1) Urban texture is a symbol of urban civilization. It was formed through long-term historical years. It coexists with the emergence and development of cities. Whether a city has attractive features depends largely on the exquisiteness and richness of urban texture.

Urban texture is directly related to the details of the city, touching human vision and various perceptions. The city is a whole. Buildings, roads, courtyard plots, and greenery are the elements that make up the whole. Urban texture is composed of superposition of urban elements, which is characterized by integrity, continuity, and collage. Different regions and cultures have their own unique manifestations in urban texture.

"Four main features" of the urban texture

Feature 1: urban texture is the material carrier that records the historical information of the city. In the urban form, the style and style of the building is comparatively superficial. Its change

is influenced by the ideological trend of the times (Figure 2). The urban texture, such as the road shape, the scale of the street, the surface texture, and the social, cultural, and economic contents, are more closely related. Relationships are gradually evolved during the long-term historical development of the city. Therefore, in the urban form, the urban texture is relatively more stable and continuous.



Figure 1. The urban texture of triangle, square and rectangle

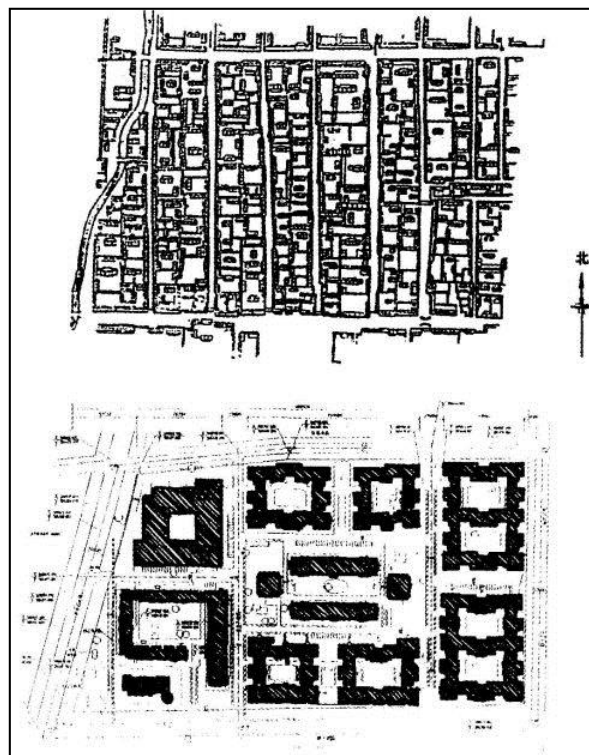


Figure 2. The texture change of a block in Beijing carries historical information

Feature 2: urban texture is an important basis for guiding urban development. Urban texture can help us to interpret the potential laws in the process of urban development and guide a new round of urban development and construction. Urban development, in a sense, selectively retains existing textures, or excavates primitive textures, or replaces textures that lose vitality with new textures, or uses new functions to awaken the process of troubled textures.

Feature 3: urban texture reflects the characteristics of a city. For example, Wuhan's texture's conformity with the roads and neighborhoods formed by the trend of the Yangtze River is a unique charm that differentiates Wuhan from other cities, and it also adds competitiveness and vitality to its current fierce regional competition (Figure 3). At the same time, the urban texture retains the characteristics that are compatible with the lifestyle of residents and demonstrates the unique culture of a city.



Figure 3. The texture of fishbone streets and alleys in Hanzheng Street, Wuhan reflects the characteristics of the city

Feature 4: urban texture is an important link between citizens and cities. Whether it is a city road or a street courtyard, it is directly related to the daily life of the citizens. The urban texture reflects the citizen's activities. The inheritance of such activities and culture of people are related to the pattern of the street and courtyard. Therefore, to protect the urban texture is to allow the activities of citizens to be continued and inherited, which enhances the public's sense of pride and belonging.

Methodology

Graph-bottom relationship theory

The theory of map-bottom relations shows that the relationship between maps and the bottom is one of the important means of judging the success or failure of urban external space. Roger. Trancik said in the book "Lost Space for Lost": "The theory of graph-bottom relationship studies the relative proportions between ground-based building entities and open-bodied bodies. In every urban environment, there is an established mode of entity and virtual entity.

The use of the map-bottom method in spatial design can be used to determine the relationship between the bottom and the bottom of the graph by adding or subtracting changes from the actual shape of the manipulation pattern. The purpose of controlling the relationship between maps is to establish different spatial levels and to clarify the spatial structure within the metropolis or region. Individually, the sizes of these spaces are different, but they are all closed, and they still maintain a certain order relationship between them. At the same time, the use of

graph-to-bottom relationship analysis can, on the one hand, directly reflect the space in urban areas. The “texture” and structural organization formed in the time span of the pattern, and through the comparison of maps and bottom graphs at different historical periods in the same location, the existing problems in the urban sector and the frequency and direction of its construction can be analyzed. It provides guidance for the shaping of follow-up urban spatial forms. On the other hand, in the integrated design process of “urban debris”, the graph-to-bottom relationship diagram can also be used to test whether the design is in harmony with the environment structure relationship in terms of scale, morphology, structure, and organization, so as to obtain a good overall city. The pattern table of the graph bottom relationship analysis is shown in Table 1.

Table 1

The pattern table of the graph bottom relationship analysis

	Buildings as backdrop, highlighting space	Space as background, highlighting the buildings
Shape object	Shape space. Surrounding spaces with architectural shapes. Space places are the design goals.	Shape body mass. Surrounding buildings with open space, with individualized and prominent masses is the goal of design
Field of application	Traditional design methods aiming at creating positive space.	Modern urban design under the globalization theory with the purpose of building positive building mass.
Morphological features	Uniform texture, image of a unified regional image. Regional signs and node images are relatively weak.	The regional image is rather messy and lacks a unified image of the neighborhood. Regional signs and nodes are well-defined and have strong imagery

Measurement and analysis

An Analysis of the transitional stage of Hankou City's texture

The formation of the texture of historical cities in Hankou is a kind of thing formed by the collision and blending of traditional culture and foreign culture. During various periods of urban development in Hankou, various urban planning cultures affected the urban texture of Hankou, experienced many urban planning practices, and were partially implemented. This has had a direct impact on the urban fabric of Hankou, or it has never changed. It can be implemented, but it also reflects a trend of urban cultural development.

1. The first stage – the legacy of the nature and traditional buildings, laid the foundation for texture. At this stage, the city's texture structure is represented by the natural city derived from the traditional “courtyard style” in southern China and the “front shop and back home” style mixed in commercial markets. Due to the early commercialization of the town of Hankou, the “boat house” of the floating people, the “hanging house” along the river bank, and the “shelf house” near the Luhan Railway have become the parts of Hankou since the late Qing Dynasty. The “Chinese community” is an important factor in the form of living, and it has a strong sense of place. In the late Qing Dynasty, the old urban district of Hankou, China has already formed three sections: “Hejie” (now Yanhe Avenue), “District Street” (now Changdi Street), and “Zhengjie” (now Hanzheng Street). The three streets are roughly parallel to the streets of Hanshui (Figure 4).

At the same time, they also form the north-south to the secondary street, which is basically perpendicular to the Han River, leading to the riverbanks. The spatial texture of urban space is very different from the strict ritual system of ancient Chinese cities. It belongs to the commercial and social spatial characteristics of the sprouting state of capitalism under the conditions of endogenous and semi-natural economic and social conditions, thus forming a traditional business and trade town with the distribution of goods as the trigger point.



Figure 4. Texture of the old city of Hankou

In the “self-organizing process”, the spatial pattern of urban space is formed. Residents tend not to stick to the strict north-south orientation relationship, and there is no obvious urban axis relationship. The layout of the streets and lanes looks more like a random formation, with great life scenes and vitality; such as Hanzheng Street, Changdi Street in the Old City of Hankou, and the oriental traditional streets. It combines numerous and complex ecological behaviors that breed what we now call “streets”. “Culture” is a derivative of urban space. It is the result of the continuous accumulation of citizen life in the urban public space. Therefore, it can be said that the first stage is the derivation of the remains of the nature and traditional buildings, which laid the foundation for the texture of the urban historical city of Hankou.

2. The second stage – the establishment of the concession, refinement of texture. In 1861, when Hankow was opened and the modernization of the city of Hankow was entered in the early stages of Western culture, the construction of the concession began passively. Western countries also brought advanced urban planning ideas while building the concession. In the first year, the British first opened up a lease in Hankou, and specifically designed a plan for the concession. In the following year, Germany, Russia, France, and Japan successively established a concession in Hankou, and the five countries’ concessions followed the Yangtze River. Countries are building in their respective concessions, including the development of streets, the construction of embankments and docks.

The early importation of Western urban culture is represented by the large-scale construction of the road under the guidance of streetism. The road morphology is more regular, and the layout of roads is mostly in the form of square grids. The architecture is mostly Western classical style. In addition to the British Concession, no detailed planning has been carried out in the other concessions, and the questions asked by the concessions have been established independently of each other. There is no unified planning. Therefore, there are a large number of irregular plots similar to triangles in the modern urban area of Hankou. However, in order to maintain a unified setting of the municipal facilities in the concession and maintain the continuity of water supply and power supply, the road between the concessions is basically maintained. This has caused the phenomenon of the roads in the modern urban area of Hankou to be broken and crooked.

Western urban culture is full of antithetical relations. Compared with the pureness of Chinese culture, it is full of logic and symbolizes efficiency and fairness. Through rent and urban planning in the border areas, the urban texture is also generally in geometric form. With the establishment of the Hankou British Concession in 1861 and the formation of an urban space pattern that was very different from the “Chinese community” in Hankou, the urban morphology began to change greatly, making the rapid development of Hankou from the township of a feudal agricultural society in the past to the prosperity of modern China. Take the British Concession as an example, five roads that are basically parallel to the Yangtze River and six roads that lead to the Yangtze River at an angle of 72° with the Yangtze River constitute a diamond-shaped road network with a similar grid pattern; these five vertical The streets laid the foundation of the road networks for the concessions in the following countries (Figure 5).



Figure 5. The basic pattern of the British concession road network

In terms of planning, the concession is based on blocks as the basic land-use unit and ordered grid space texture characteristics; specific to each concession is still different, such as Russia and the French Concession, with strong neo-classical urban planning techniques, more emphasis on the artistry of the urban space; while the German concession and the Japanese concession, the space is the most simple chessboard block pattern. In the concession, the strict planning makes it necessary to build houses according to certain rules.

As shown in Figure 6, other concessions have begun to follow the example of the small street profile and began to build their respective concessions. The Russian Concession and the French Concession refer to the British Concession as the standard in the direction of the road network, and adjust it. As for the German and Japanese concessions, the vertical road has finally been adjusted to the vertical state of the Yangtze River, forming a regular grid layout. After the year, with the opening of the Beijing-Hanyang Railway, in order to better communicate the concession and the railways, the concessions began to build roads leading to the railways, and at the same time paved the railroads that lead to the Jing-Han Railway. Such roads or railways are often used as transportation. Because of the use, most of them have not gone through detailed planning, but are only isolated constructions. At the same time, they have not considered the relationship with the terrain, resulting in the irregular shape of many street profiles in modern urban areas of Hankou.

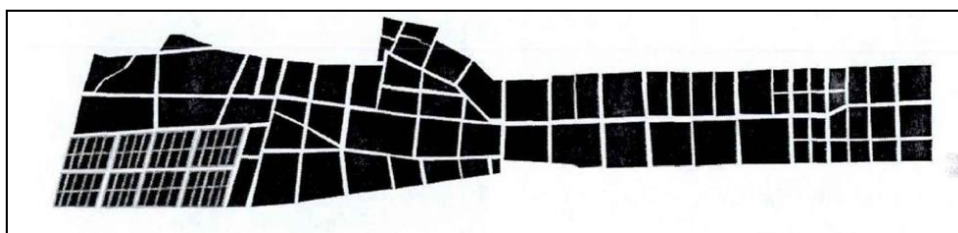


Figure 6. Small street profile model in other concessions

3. The third stage – the construction of the new district, blending old and new textures.

After the opening ceremony, with the construction of the concession area, western culture represented by advanced urban planning concepts and building techniques was introduced into Hankou. In the past, the land on the beach in Hankou became a new type of city. Straight roads, tall buildings, neat streets contrasted with crowded streets, low buildings, and intertwined street space. Through the new and modernized urban space in the concession, the Hankou people in the Chinese mainland have first encountered foreign advanced culture.

The ancient Hankow period was a traditional Chinese small-scale industrial and commercial city. Under the guidance of secular culture, urban construction was a spontaneous bottom-up process. It was classified according to the type of urban texture. Hankou was a typical spontaneously formed Chinese traditional type. city. After the construction of the concession, Chinese people began to carry out preliminary planning exercises for the city. The implementation of urban planning has a huge impact on the urban fabric of Hankou. Using the Hankou Concession as a template, a large area between the north of the concession and the Beijing-Hanshan Railway has become an experimental field for early urban planning and construction. On the one hand, it emulates the foreign city planning management system and has specifically established the Hankou Architecture Office, on the other hand, Hankou 's streets are planned in a unified way, and they follow the scale of Paris and London. They plan roads in the town of Hankou and draw 'Street map of the whole town of Hankou' (Figure 7).

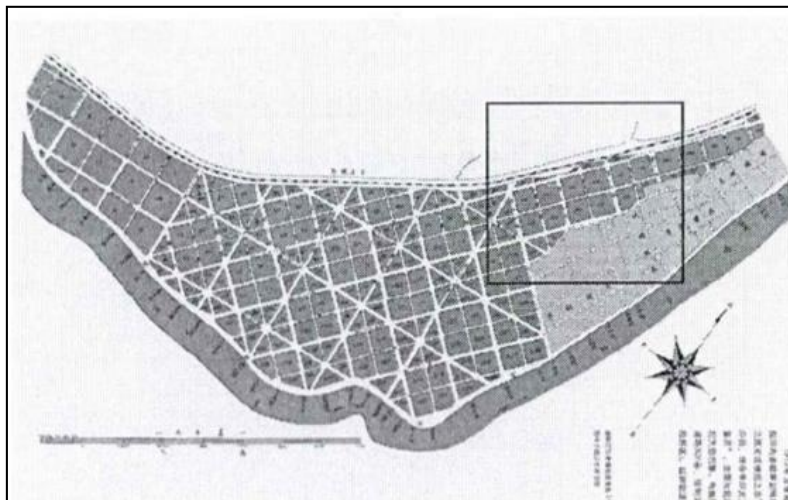


Figure 7. Street map of the whole town of Hankou

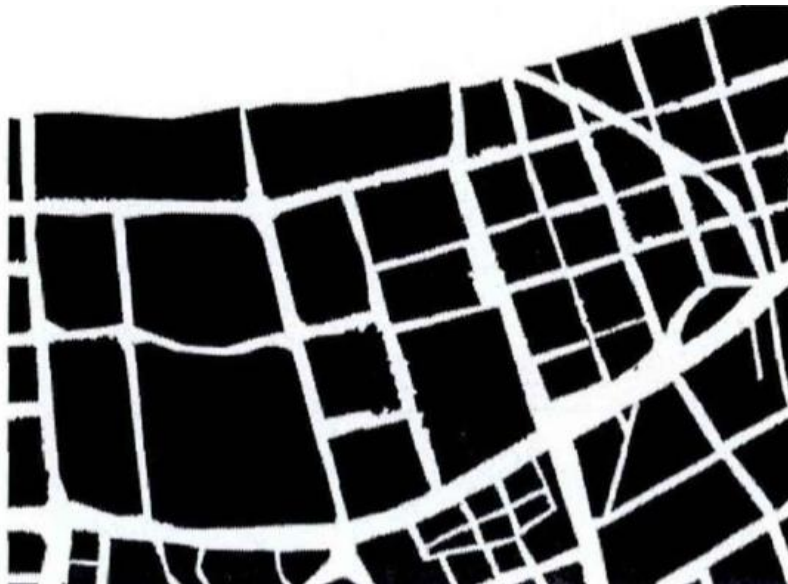


Figure 8. The grid texture in the model area

Finally, the parts of the figure are implemented, called the “model area” (Figure 8). By comparing the urban texture of the “modern area” in the modern new district with that of the concession area, the road network formed in the new district is more regular than the concession

area, and the scale of the plot is smaller. This illustrates the grid layout has been widely recognized and accepted by the people. This model is more suitable for the linear growth model of the development of the Yangtze River along the Hankou, and is conducive to improving the value of the land.

Conclusion

According to the three transitional stages of the textures in Hankou, the transformation mechanism of the cities can be outlined.

Influence of the geographical environment

Geographical environment is the foundation of human society's dependence and the most basic material condition for the formation and development of cities. The influence of natural factors on urban development is the most significant and has always been accompanied by the entire process of urban formation and development. Differences in natural factors make different cities have urban texture with local characteristics.

As the basic unit of urban texture, architectural texture influences the sense of space of the city. In the process of city formation, it follows the climatic characteristics and changing rules. Hankou, for example, is located in the middle reaches of the Yangtze River and belongs to the north subtropical monsoon humid climate. Its climate characteristics are cold in winter, hot in summer, high in humidity and heat. Based on the existing environmental characteristics, ventilation and heat insulation are the main considerations in urban planning and architectural design in Hankou. Therefore, the main building of Hankou is oriented toward the North-South direction. The building direction of the ancient city is generally parallel to the north-south direction of the Han River. There are no north-south roads in the concession area, and the buildings are arranged along the streets, so as to make better use of the value of the land along the river. The building is generally perpendicular to the direction of the Yangtze River. After the construction of the new area in modern times, the main direction of the building was adjusted in a direction parallel to the Yangtze River, which is conducive to accepting the airflow from the river surface and forming a good ventilation effect.

The construction of Hankou is a process of constantly adapting and renovating the environment. Through continuous adjustment of the building's orientation, good ventilation is achieved. At the same time, through the construction of technical means, and constantly transform their own building environment, the final formation of urban texture based on climate characteristics.

Development of social and economic spheres

Urban texture, as a two-dimensional representation of urban space, is a product of the materialization of complex human social economic activities in the historical development process, and is a representation of the physical space of urban functional organization. The intrinsic mechanism of its formation, development, and evolution essentially comes from the requirements that the urban form constantly adapts to the socio-economic background and changes in urban functions.

In modern times, the main function of the city changed from the rule of the residents in the ancient period to the plunder of the capitalism by foreign capitalist countries and the revival of national capitalism in the latter part of modern times. Therefore, modern society and economy have played a huge role in promoting the development of the city.

The promotion of socio-economic development is mainly reflected in the maximization of land use value. During the construction of the concession in the historical district of Hankou, the city used a refined layout of square grid roads to extend the road network density, reduce the size of the plots, and increase the length along the street, ultimately maximizing land use efficiency.

Such an approach will present various types of diversified spaces, prompting the appearance of various characteristics such as street buildings, arcades, etc. in modern urban space.

Input of cultural awareness

The city is a material manifestation that people accumulate for a long period of time in accepting cultural input. Whether it is a spontaneously formed city or a planned city, it relies on the will of groups or individuals to shape the urban form.

In the modern period of the city, with the introduction of Western urban planning ideas, various modern cities began to draw up plans and plans for text production. As a direct predictive control method for urban development, they played an important role in the development of modern cities. They emphasize urban function and efficiency, and lay out the overall layout of the city through a grid-style road network system and a regular street profile. Under the influence of Western culture, the urban structure of modern Chinese cities has undergone tremendous changes, but the urban space still maintains the inwardness and unity of local culture.

Under the influence of China's cohesive culture, urban space is cut from the building entity and is an active, enclosed urban space. It is the influence of this traditional cohesive culture that has essentially led to the special urban space texture of modern cities. The texture of modern cities is an external manifestation of the extension and development of local Chinese cultural concepts under the influence of Western culture.

In all, through the analysis of Hankou City's texture, the overall characteristics of the city's urban fabric in the historical district of Hankou are summed up by integrating Chinese and Western cities and architectural concepts, and through urban two-dimensional. The urban texture of Hankou historical urban area is a certain universal character, and there are some subtle differences between individuals. Therefore, the urban texture of the city has been characterized by collage, openness, and regionality.

References

1. Al Hemaiddi, W. K. (2002). *The metamorphosis of the urban fabric in Arab-Muslim City: Riyadh, Saudi Arabia*[J]. Journal of Housing and the Built Environment, 2.
2. Hamouche, M.B. (2009). *Can Chaos Theory Explain Complexity In Urban Fabric? Applications in Traditional Muslim Settlements*. Nexus Network Journal.
3. Soe, Win Myint (2008). *A Robust Texture Analysis and Classification Approach for Urban Land-Use and Land-Cover Feature Discrimination*. Geocarto International.
4. Madsen, D. (2015). *Len Lye Centre New Plymouth, New Zealand Patterson Associates*[J]. Architect, 9.
5. Vesely, D. (2007). *Form Typology to Hermeneutics in Architectural Design*. Contents.
6. Dolling, R. (1982). *The Conservation of Historical Monuments in City*.
7. Armesto, J., Arias, P., Roca, J., Lorenzo, H. (2008). *Monitoring and Assessing Structural Damage in Historic Buildings*. The Photogrammetry Record.
8. Stripe R.F. (2003). *A Richer Heritage: Historic Preservation in the Twenty-first Century*.
9. Rappoport, A. (1977). *Human Aspects of Urban Form, Towards a Man-Environment Approach to Urban Form and Design*.
10. Christopher, A. (1987). *A New Theory of Urban Design*.